

LOWER PASSAIC RIVER RESTORATION PROJECT

LOWER PASSAIC RIVER STUDY AREA RI/FS

CARP HARVEST PILOT STUDY ADDENDUM TO THE QUALITY ASSURANCE PROJECT PLAN

FISH AND DECAPOD CRUSTACEAN TISSUE COLLECTION FOR CHEMICAL ANALYSIS AND FISH COMMUNITY SURVEY

DRAFT

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Acronyms

CAS	creel angler surveys
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	conceptual site model
CPG	Cooperating Parties Group
CPUE	catch-per-unit-effort
FC	field coordinator
GPS	global positioning system
HSP	health and safety plan
ID	identification
IDW	investigation-derived waste
LPR	Lower Passaic River
LPRSA	Lower Passaic River Study Area
MPI	Malcolm Pirnie
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NOAA	National Oceanic and Atmospheric Administration
PM	project manager
PQO	project quality objective
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RI/FS	remedial investigation/feasibility study
RM	river mile
SOP	standard operating procedure
USACE	US Army Corps of Engineers
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
Windward	Windward Environmental LLC
WRDA	Water Resources Development Act

Introduction

This is an addendum to the Lower Passaic River (LPR) Restoration Project *Quality Assurance Project Plan: Fish and Decapod Crustacean Tissue Collection for Chemical Analysis and Fish Community Survey* (Windward 2009), hereafter referred to as the Fish/Decapod Quality Assurance Project Plan (QAPP). The Fish/Decapod QAPP reviewed by the US Environmental Protection Agency (USEPA) and its Partner Agencies¹ was approved by USEPA on August 6, 2009. This addendum to the Fish/Decapod QAPP, hereafter referred to as Fish/Decapod QAPP Addendum No. 6, describes the carp harvest pilot study for the Lower Passaic River Study Area (LPRSA).

The LPRSA is known to be degraded by multiple stressors common to urban rivers. It is thought that common carp (*Cyprinus carpio*) may be contributing to the impairment of the LPRSA's water quality and the alteration of its benthic invertebrate community. It is also thought that through active management of common carp, the habitat quality of the LPRSA can be improved to allow for greater abundance and diversity of native aquatic plants, fish, and invertebrates; such improvement may also benefit higher trophic level species, which prey upon native aquatic plants, fish, and invertebrates. Active management of carp for consumption by humans will also help reduce potential health risks.

There are a number of carp management options to control the movement and abundance of carp in the LPRSA, including targeted fishing and the use of gillnets, seines, and electrofishing to remove carp; carp separation cages and other exclusion devices; and experimental methods such as using viral agents and genetically modifying a carp population to produce only males. Although little is known about carp movement in the LPRSA, some inferences can be made from collected data and community survey events performed by Windward Environmental LLC (Windward) in 2009 and 2010, creel angler surveys (CASs) performed by AECOM in 2010 and 2011, and available literature to help develop an efficient carp management plan.

Electrofishing has been selected as one viable method for managing carp in the LPRSA, because it was an effective method for collecting carp in the LPRSA community surveys conducted by Windward in 2009 and 2010 and upriver of Dundee Dam in 2012. Although no method will completely eliminate carp from the LPRSA, actively removing carp should help reduce the carp population, especially when large (i.e., breeding) adults are targeted. This pilot study will examine the efficiency of harvesting carp from the LPRSA using electrofishing techniques. Using knowledge obtained from previous site investigations, a focused three-day effort in October 2013 should suffice to provide the information necessary to assess electrofishing as a management method option for harvesting carp.

The Fish/Decapod QAPP Addendum No. 6 includes updates to worksheets and attachments relevant to the carp harvest pilot study in the freshwater portion of the LPRSA. It does not include worksheets or attachments that are unchanged or irrelevant to this effort. Applicable and/or updated worksheets and attachments included in this addendum are presented below:

- ◆ Worksheet No. 1 contains the title and approval pages for the addendum.

¹ The Partner Agencies include the US Army Corps of Engineers (USACE), New Jersey Department of Environmental Protection (NJDEP), New Jersey Department of Transportation (NJDOT), National Oceanic and Atmospheric Administration (NOAA), and the US Fish and Wildlife Service (USFWS).

- ◆ Worksheet No. 3 provides the distribution list.
- ◆ Worksheet No. 10 describes the specific problem definition for the carp harvest pilot study.
- ◆ Worksheet No. 11 provides the project quality objectives (PQOs).
- ◆ Worksheet No. 13 provides the secondary data criteria and limitations.
- ◆ Worksheet No. 14 provides a summary of project tasks.
- ◆ Worksheet No. 16 provides the schedule and timeline.
- ◆ Worksheet No. 17 provides the pilot study design and rationale.
- ◆ Worksheet No. 18 provides the proposed electrofishing locations and sampling standard operating procedure (SOP) requirements.
- ◆ Worksheet No. 29 provides a summary of project documents and records.
- ◆ Worksheet No. 37 provides the usability assessment.
- ◆ Attachment A is a protocol modification form.

QAPP Worksheet No. 1. Title and Approval Page

Addendum to the *Quality Assurance Project Plan for Fish and Decapod Crustacean Tissue Collection for Chemical Analysis and Fish Community Survey*

Document Title

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Lead Investigative Organization

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QAPP Worksheet No. 1. Title and Approval Page

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QAPP Worksheet No. 3. Distribution List

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QAPP Worksheet No. 3. Distribution List

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QAPP Worksheet No. 10. Problem Definition

The problem to be addressed by the project:

The LPR watershed is highly urbanized and receives inputs of industrial and municipal wastes. These inputs have resulted in widespread habitat and biodiversity losses, the accumulation of chemicals in river sediments and biota, and impacts on water quality, the cumulative effects of which have substantially degraded the ecosystem of the LPRSA. The LPRSA is the estuary portion of the Passaic River between Dundee Dam and Newark Bay that is the subject of a remedial investigation/feasibility study (RI/FS). Conceptual site models (CSMs) of the LPRSA presented in summary reports and planning documents (e.g., Battelle (2005), Windward and AECOM (2009), Malcolm Pirnie (MPI) (2007a, b), and MPI et al. (2005)), as well as USEPA guidance and recommendations (USEPA 2002, 2008), recognize that conditions within the LPRSA and ongoing inputs of chemical and environmental stressors originating from areas both inside and outside the LPRSA need to be taken into account during the risk assessment and remedial decision-making processes. Each regional background input has a corresponding contribution to the overall risks potentially posed to humans and ecological receptors within the LPRSA.

The LPRSA is known to be degraded by multiple stressors common to urban rivers. It is thought that common carp may be contributing to the impairment of the LPRSA's water quality and the alteration of its benthic invertebrate community. It is also thought that through active management of common carp, the habitat quality of the LPRSA can be improved to allow for greater abundance and diversity of more sensitive native aquatic plants, fish, and invertebrates; such improvement may also benefit higher trophic level species, which prey upon native aquatic plants, fish, and invertebrates. Active management of carp will also help reduce potential risk levels to humans that may consume carp from the LPRSA.

There are a number of carp management options to control the movement and abundance of carp in the LPRSA, including targeted fishing and the use of gillnets, seines, and electrofishing to remove carp; carp separation cages and other exclusion devices; and experimental methods such as using viral agents and genetically modifying a carp population to produce only males. Although little is known about carp movement in the LPRSA, some inferences can be made from past community survey events performed by Windward in 2009 and 2010 (Table 1), CASs performed by AECOM in 2010 and 2011 (Table 2), and available literature to help develop an efficient carp management plan.

Electrofishing has been selected as one viable method for managing carp in the LPRSA, because it was an effective method for collecting carp in the LPRSA community surveys conducted by Windward in 2009 and 2010 and upriver of Dundee Dam in 2012. Although no method will completely eliminate carp from the LPRSA, actively removing carp should help reduce the carp population, especially when large (i.e., breeding) adults are targeted. This pilot study will examine the efficiency of harvesting carp from the LPRSA using electrofishing techniques. Using knowledge obtained from previous site investigations, a focused three-day effort should suffice to provide the information necessary to assess electrofishing as a management method option for harvesting carp.

QAPP Worksheet No. 10. Problem Definition

The environmental questions being asked:

The specific question covered in this addendum is: "Is electrofishing to catch and remove carp an efficient method of managing carp populations in the LPRSA?" Further detail on how the data will be used is presented in Worksheet No. 11 of this QAPP addendum.

A synopsis of secondary data or information from site reports:

Carp were caught in the LPRSA from river mile (RM) 5 to RM 17.4 during the 2009 and 2010 tissue collection and community survey events (Figure 1) (Windward 2010, 2011). Carp were caught by electrofishing in the LPRSA from RM 7 to Dundee Dam at RM 17.4, with the exception of between RM 11 and RM 12 (Table 1). The greatest numbers of carp caught by electrofishing were between RM 8 and RM 9 in 2009 and 2010.

Table 2 presents a summary of the carp catch total and locations reported in the 2010 and 2011 CAS (AECOM [in prep]). Carp were caught in the LPRSA from approximately RM 7 to Dundee Dam at RM 17.4. The greatest numbers of carp were caught just below Dundee Dam between RM 17 and RM 17.4.

The rationale for sampling area:

Known areas throughout the LPRSA where carp were caught during the 2009 and 2010 tissue collection and community survey events (Figure 1) and the 2010 and 2011 CASs will be targeted during the three-day carp harvest pilot study. Carp were observed to be fairly evenly distributed in all areas of the LPRSA above RM 5. However, electrofishing was more successful (i.e., had a higher catch-per-unit-effort [CPUE] ratio) above RM 7, where salinity was low and, therefore, conductivity was low enough to effectively electrofish. Table 1 shows the CPUE for carp using boat electrofishing for the 2009/2010 combined data. Table 2 provides a summary of CAS data showing that the greatest number of carp were caught immediately below Dundee Dam.

During the pilot study, electrofishing will be conducted from a boat or on foot, as appropriate, to capture as many carp as possible. Windward will target areas above RM 7, where there were higher boat electrofishing and gillnet CPUEs in the 2009 and 2010 field efforts. Specifically, electrofishing will be conducted between RM 7 and RM 17.4 in shallower nearshore areas that may provide habitat for carp. The segment of the LPRSA from RM 7 to RM 16 is accessible by boat, but the segment from RM 16 to Dundee Dam (RM 17.4) is shallow, and can only be accessed from land on foot. Sampling locations may be adapted based on

QAPP Worksheet No. 10. Problem Definition

current field conditions and observations. All carp caught will be weighed and measured, humanely euthanized by severing the notochord, and disposed of off-site as solid waste.²

Project decision conditions:

The conditions for project decisions (i.e., those decisions that may require communication between the Cooperating Parties Group [CPG] and USEPA during the pilot study) include the identification of target electrofishing locations and the potential need to add or relocate those locations, and the need to delay or suspend the pilot study because of hazardous weather conditions.

Communication will be established with USEPA during the pilot study regarding the selection of target sampling locations. Additional sampling areas will likely be added during sampling based on field conditions, *in situ* observations, and observations of habitat suitability, as well as boat and gear accessibility. Any changes made to target locations or new target locations added during the effort will be communicated to USEPA.

CPG will suspend operations immediately under conditions of extreme weather and/or environmental conditions that are a threat to worker health and safety.

² Windward is researching the possibility that carp would need to be managed as investigation-derived waste (IDW).

Table 1. CPUE for common carp using boat electrofishing during 2009–2010 surveys

RM	No. Caught	CPUE
7 to 8	9	1.5
8 to 9	14	3.5
9 to 10	9	2.3
10 to 11	5	0.8
11 to 12	0	0.0
12 to 13	5	0.7
13 to 14	1	0.3
15 to 16	4	0.3
16 to 17.4	5	0.4
Total	52	0.9

CPUE – catch-per-unit-effort

RM – river mile

Table 2. Common carp caught during 2010–2011 creel angler surveys

Fishing Site	RM	No. Caught
44	6.4	0
42	6.8 to 7	1
36	8.5	0
33	9.1	3
27	10.4	5
24	11.2	1
17	12.8	2
16	12.9	4
13	13.9	7
10	14.5	1
7	15.5	9
6	15.8	0
5	16.1	0
3	16.7	3
25	10.8 to 11.1	0
14	13.4 to 13.6	0
1	17 to 17.4	17
Total		53

RM – river mile

QAPP Worksheet No. 11. Project Quality Objectives/Systematic Planning Process Statements

Who will use the data?
The data collected under this QAPP addendum will be used by CPG and USEPA for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-related decisions, specifically to support the FS, and by other interested parties (e.g., USACE, NJDEP, USFWS, NJDOT, and NOAA) for other purposes, including Water Resources Development Act (WRDA) activities, such as restoration planning.
What will the data be used for?
<p>The data collected during this pilot study will be used in supporting the FS to:</p> <ul style="list-style-type: none"> • Document the relative abundance and distribution of carp in the freshwater portion of the LPRSA. • Document the potential for using electrofishing techniques to harvest carp as part of a carp management program.
What types of data are needed?
<p>Carp will be collected using boat and backpacking electrofishing gear. The specific electrofishing gear used will be determined at the time of sampling based on an assessment of which will be most appropriate and potentially effective for that particular location in the LPRSA. Some factors to be considered when selecting appropriate electrofishing gear and locations include site accessibility, substrate, water depth, salinity, and habitat structure.</p> <p>For all electrofishing attempts, location coordinates, electrofishing equipment settings, electrofishing duration, and catch results will be recorded. Total length and weight measurements of carp caught will be also be documented.</p>
Matrix
During the pilot study, all carp will be retained regardless of size. Total body lengths and weights of fish will be measured.
How many data are needed?
The objective of this pilot study is to determine whether electrofishing would be an effective method for collecting carp as part of a carp management option. Thus, the goal is to collect as many carp from the LPRSA as possible within the three-day pilot study period.

QAPP Worksheet No. 11. Project Quality Objectives/Systematic Planning Process Statements

Where, when, and how should the data be collected/generated?

River Segments

The general sampling design allocates the pilot study between two segments of the freshwater portion of the Passaic River. The segment from RM 7 to RM 16 is accessible by boat, while the segment from RM 16 to Dundee Dam (RM 17.4) is shallow and can only be accessed from land on foot.

Sampling Locations

Electrofishing locations will be targeted within known or likely carp habitat areas in each of the two segments. Proposed sampling locations are based on locations where carp were successfully caught during the fish tissue collection and community surveys (Windward 2010, 2011), and on conditions reported in the CAS (AECOM [in prep]). Additional sampling areas will likely be added during sampling based on field conditions, *in situ* observations, and success at attempted locations during sampling (i.e., sample locations will be based on observations of habitat suitability, as well as boat and gear accessibility).

Collection Methods

A minimum of two electrofishing passes will be attempted at each location selected. The use of boat or backpack electrofishing equipment will be based on specific location factors such as accessibility, substrate, water depth, salinity, and habitat structure.

Timing

This effort for the carp harvest pilot study will be conducted for a maximum of three days in October 2013. All changes to the proposed plan due to field conditions will be communicated between USEPA and CPG technical coordinators or project managers (PMs).

Who will collect and generate the data?

Windward will provide field sampling coordination and support. Windward will also provide the field personnel, who will oversee and conduct the carp collection efforts.

QAPP Worksheet No. 11. Project Quality Objectives/Systematic Planning Process Statements

How will the data be reported?

Daily catch results will be communicated (e.g., telephone conversation or e-mail) to CPG PMs and project coordinators.

An electronic database that includes the coordinates of collection for each individual carp or electrofishing attempt will be provided. The database will include carp collection time, collection location depth, and length and weight of all individual carp. The electronic database will be updated daily, and will be available for USEPA on a daily basis.

A report summarizing the carp harvest results will be provided 90 days after completion of the pilot study. The report will include a map that presents the actual catch locations. A summary of abundance, lengths and weights, and catch effort will be presented, and the report will summarize any modifications to the proposed pilot study as outlined in this QAPP addendum.

How will the data be archived?

Data records, forms, and notes will be scanned and stored electronically in a project file. Hard copies will be archived by Windward's main office in Seattle, Washington. Similarly, after issuance, the summary report will be archived electronically and as a hard copy.

QAPP Worksheet No. 14. Summary of Project Tasks

Project Area: Freshwater LPRSA, approximately RM 7 to RM 17.4 (Dundee Dam)	
Sampling Tasks:	This effort for the carp harvest pilot study will be conducted for a maximum of three days in October 2013 between RM 7 and RM 17.4, the freshwater segments of the freshwater portion of the LPRSA. The segment from RM 7 to RM 16 is accessible by boat, and the segment from RM 16 to Dundee Dam (RM 17.4) is shallow and can only be accessed from land on foot. A minimum of two electrofishing passes will be attempted at each location selected. The use of boat or backpack electrofishing equipment will be based on specific location factors such as accessibility, substrate, water depth, salinity, and habitat structure. Electrofishing locations will be targeted within known or likely carp habitat areas in each of the two segments. Proposed sampling locations are based on locations where carp were successfully caught during the fish tissue collection and community surveys (Windward 2010, 2011), and on conditions reported in the CAS (AECOM [in prep]). Additional sampling areas will likely be added during sampling based on field conditions, <i>in situ</i> observations, and success at attempted locations during sampling (i.e., sample locations will be based on observations of habitat suitability, as well as boat and gear accessibility).
Analysis Tasks:	At each electrofishing site, location measurements (e.g., coordinates, depth, and any other relevant observations, such as habitat type) will be recorded on the Location Data Form (Attachment B of the Fish/Decapod QAPP (Windward 2009)). Carp total lengths and weights will be also measured.
Quality Control (QC) Tasks:	All field notes and forms completed during the field sampling task will be checked daily by the field coordinator (FC). The FC will also communicate daily with the Task Quality Assurance (QA)/QC Manager to confirm PQOs are being met. Lengths and weights will be compiled in a table and reviewed as a QC step. Any lengths and weights that appear to be anomalous will be remeasured and verified by a second team member. Electronic sampling equipment (e.g., scale and global positioning system [GPS] units) will be calibrated, maintained, tested, and inspected according to manufacturers' specifications as necessary to ensure they are functioning properly (see Worksheet No. 22 of the Fish/Decapod QAPP (Windward 2009)).
Data Management Tasks:	Data management tasks will include keeping accurate records of field activities and observations, so that project team members using the data will have accurate and appropriate documentation. Data management activities will be conducted in accordance with the project data management rules. GPS data will be downloaded and stored electronically in a project file. Subsequently, the spatial data will be mapped for the data report.

QAPP Worksheet No. 14. Summary of Project Tasks

Project Area: Freshwater LPRSA, approximately RM 7 to RM 17.4 (Dundee Dam)	
Documentation and Records:	<p>It is important that field activities be documented in an organized, chronologically-accurate manner. All field activities will be recorded in a field logbook maintained by the FC. The field logbook is intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the sampling period. Procedures for documentation are presented in Attachment P of the Fish/Decapod QAPP (Windward 2009). All relevant forms and records are presented on Worksheet No. 29 of the Fish/Decapod QAPP (Windward 2009). In general, the following information must be recorded:</p> <ul style="list-style-type: none"> • The identities and affiliations of the personnel conducting field activities • Model numbers and serial numbers of instruments and/or equipment being used, to the extent available • A description of the type of field work being conducted and the equipment used • The date and time the field activities were initiated and completed, with specific temporal information for each task (e.g., record the time activities commenced at each individual location, if applicable) • The site where the field activities were conducted, and any locations within that site where work was performed (e.g., specific sampling sites, coordinates, and depths) • The general methodology used to conduct the activities • Communications with PMs and personnel regarding field activities • Field-collected data (e.g., GPS measurements and catch totals) • Daily health and safety briefings • Deviations from the QAPP, SOP, or project health and safety plan (HSP) (Attachment R of the Fish/Decapod QAPP (Windward 2009)), reason for change, and any corrective actions taken, which will be electronically documented on the Protocol Modification Form (Attachment A) • Photos. When photos associated with sampling locations, field activities, or samples are taken, they will include the date, time, photographer, and a brief description. <p>All entries must be made in language that is objective, factual, and free of personal feelings or other terminology that might prove inappropriate.</p> <p>The Location Data Form (Attachment B of the Fish/Decapod QAPP (Windward 2009)) will also be filled out electronically by field personnel. A daily tally of all species caught will be recorded on the Specimen Tally Form (Attachment D of the Fish/Decapod QAPP (Windward 2009)) and the Non-Target Species Tally Form (Attachment E of the Fish/Decapod QAPP (Windward 2009)).</p> <p>A record of all personnel briefed on the HSP will be maintained by the FC, Site Safety and Health Officer, or designee. The record will be archived at Windward's Seattle office upon completion of the sampling efforts.</p>
Assessment/Audit Tasks:	<p>The FC will communicate frequently with the Investigative Organization Task QA/QC Manager to confirm PQOs are being met. Assessment/audit tasks will be conducted, as summarized in Worksheet No. 31 of the Fish/Decapod QAPP (Windward 2009). Reviews of field activities/sampling method compliance will be conducted periodically.</p>

QAPP Worksheet No. 14. Summary of Project Tasks

Project Area: Freshwater LPRSA, approximately RM 7 to RM 17.4 (Dundee Dam)	
Data Review Tasks:	<p>All field records will be reviewed by the FC for completeness and accuracy, and verified by the Task QA/QC Manager or a designee.</p> <p>As part of report preparation, data will be reviewed to determine if differences related to location are evident. In addition, the report will undergo a senior and peer review process before the final draft is submitted to USEPA (see Worksheet Nos. 34 and 37 of the Fish/Decapod QAPP (Windward 2009) for relevant procedures).</p>
Deliverables:	<p>A report summarizing the pilot study will be provided to USEPA within 90 days of completion, and will include a map illustrating the harvest results and actual electrofishing locations.</p>

QAPP Worksheet No. 16. Project Schedule/Timeline Table

Activity	Organization	Date (MM/DD/YY)		Deliverable	Deliverable Due Date (MM/DD/YY)
		Anticipated Date of Initiation	Anticipated Date of Completion		
QAPP preparation and delivery to USEPA	Windward	08/28/13	09/23/12	Fish/Decapod QAPP Addendum No. 6	09/23/13
Three-day carp harvest pilot study	Windward	10/08/13	10/10/13	na	na
Preparation and delivery of summary report to USEPA	Windward	10/11/13	2/13/14 (90 days after completion of the pilot study)	Carp Harvest Pilot Study Summary Report	02/13/14 (90 days after completion of the pilot study)

na – not applicable

QAPP – quality assurance project plan

USEPA – US Environmental Protection Agency

Windward – Windward Environmental LLC

QAPP Worksheet No. 17. Sampling Design and Rationale

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):

There are a number of carp management options to control the movement and abundance of carp in the LPRSA, including targeted fishing and the use of gillnets, seines, and electrofishing to remove carp; carp separation cages and other exclusion devices; and experimental methods such as using viral agents and genetically modifying a carp population to produce only males. Although little is known about carp movement in the LPRSA, some inferences can be made from past community survey events performed by Windward in 2009 and 2010, CASs performed by AECOM in 2010 and 2011, and available literature to help develop an efficient carp management plan.

Electrofishing has been selected as one viable method for managing carp in the LPRSA, because it was an effective method for collecting carp in the LPRSA community surveys conducted by Windward in 2009 and 2010 and upriver of Dundee Dam in 2012. Although no method will completely eliminate carp from the LPRSA, actively removing carp should help reduce the carp population, especially when large (i.e., breeding) adults are targeted. This pilot study will examine the efficiency of harvesting carp from the LPRSA using electrofishing techniques. Using knowledge obtained from previous site investigations, a focused three-day effort should suffice to provide the information necessary to assess electrofishing as a management method option for harvesting carp.

The general survey design allocates the pilot study between two segments of the freshwater portion of the Passaic River. The segment from RM 7 to RM 16 is accessible by boat, and the segment from RM 16 to Dundee Dam (RM 17.4) is shallow and can only be accessed from land on foot.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations):

Locations

Electrofishing locations will be targeted within known or likely carp habitat areas in each of the two freshwater segments. Proposed sampling locations are based on locations where carp were successfully caught during the fish tissue collection and community surveys (Windward 2010, 2011), and on conditions reported in the CAS (AECOM [in prep]). Additional sampling areas will likely be added during sampling based on field conditions, *in situ* observations, and success at attempted locations during sampling (i.e., sample locations will be based on observations of habitat suitability, as well as boat and gear accessibility).

Protocols

Sampling protocol and methods describing electrofishing activities that will be used to target carp from approximately RM 7 to RM 17.4 (Dundee Dam) are described in detail in Worksheet 17 of the Fish/Decapod QAPP (Windward 2009). Attachment L of the

QAPP Worksheet No. 17. Sampling Design and Rationale

Fish/Decapod QAPP (Windward 2009) details the protocol that will be implemented for boat and backpack electrofishing methods used to collect carp from the LPRSA.

Timing

The carp harvest pilot study will be conducted in October 2013.

QAPP Worksheet No. 18. Proposed Electrofishing Locations and Methods/ SOP Requirements Table

Sampling Location/ID Number ^a	Easting (X) ^b	Northing (Y) ^b	RM	Fishing Method	Sampling SOP Reference ^c	Rationale for Monitoring Location
CCH3A	584921	695554	5 to 6	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR3N)
CCH3B	584798	697881	5 to 6	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR3M)
CCH4A	585166	700324	6 to 7	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR4L)
CCH4B	587094	705442	7 to 8	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a boat electrofishing and gillnet during the 2000/2010 fish community survey (LPR4O, LPR4R)
CCH4C	588168	706783	7 to 8	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a boat electrofishing and gillnet during the 2000/2010 fish community survey (LPR4S, LPR4QQ)
CCH4D	588651	707444	7 to 8	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR4P)
CCH4E	589042	707878	7 to 8	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR4T)

**QAPP Worksheet No. 18. Proposed Electrofishing Locations and Methods/
SOP Requirements Table**

Sampling Location/ID Number ^a	Easting (X) ^b	Northing (Y) ^b	RM	Fishing Method	Sampling SOP Reference ^c	Rationale for Monitoring Location
CCH5A	589609	709404	8 to 9	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR5T)
CCH5B	589702	711831	8 to 9	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a boat electrofishing and gillnet during the 2000/2010 fish community survey (LPR5E, LPR5S)
CCH5C	591330	714199	9 to 10	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR5G)
CCH5D	592455	716313	9 to 10	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR5R)
CCH5E	592183	717297	9 to 10	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a boat electrofishing and gillnet during the 2000/2010 fish community survey (LPR5Q, LPR5PP)
CCH5F	591812	718376	9 to 10	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR5I)
CCH6A	592260	722166	10 to 11	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a boat electrofishing and gillnet during the 2000/2010 fish community survey (LPR6N, LPR6QQ)
CCH6B	592480	722944	10 to 11	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR6RR)

**QAPP Worksheet No. 18. Proposed Electrofishing Locations and Methods/
SOP Requirements Table**

Sampling Location/ID Number ^a	Easting (X) ^b	Northing (Y) ^b	RM	Fishing Method	Sampling SOP Reference ^c	Rationale for Monitoring Location
CCH6C	594051	723740	11 to 12	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR6M)
CCH6D	596201	724678	11 to 12	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR6L)
CCH7A	596952	728472	12 to 13	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR7M)
CCH7B	596887	728929	12 to 13	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR7PP)
CCH7C	596385	729848	12 to 13	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR7QQ)
CCH7D	597195	734666	13 to 14	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR7RR)
CCH7E	597481	735489	13 to 14	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR7L)
CCH8A	597833	738329	14 to 15	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR8S)

**QAPP Worksheet No. 18. Proposed Electrofishing Locations and Methods/
SOP Requirements Table**

Sampling Location/ID Number ^a	Easting (X) ^b	Northing (Y) ^b	RM	Fishing Method	Sampling SOP Reference ^c	Rationale for Monitoring Location
CCH8B	600528	737366	15 to 16	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR8U)
CCH8C	600828	738621	15 to 16	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using a gillnet during the 2000/2010 fish community survey (LPR8R)
CCH8D	599755	740370	15 to 16	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR8V)
CCH8E	599354	741619	16 to 17.4	boat electrofishing (water < 10 ft deep), backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using boat electrofishing during the 2000/2010 fish community survey (LPR8X, LPR8WW)
CCH8F	595626	746942	16 to 17.4	backpack electrofishing (wadeable waters)	1,2,5,6,10	Common carp caught using backpack electrofishing during the 2000/2010 fish community survey (LPR8KK, LPR8YY); common carp documented in CASS

^a Proposed sampling locations are based on locations where carp were successfully caught (using gillnets and electrofishing) during the fish tissue and community surveys (Windward 2010, 2011) and observed during previous CASS (AECOM [in prep]). Sampling locations may be adjusted during the carp pilot harvest effort to account for field conditions and *in situ* observations.

^b New Jersey State Plane (US survey feet).

^c Refer to Project Sampling SOP References table (Worksheet No. 21 of the Fish/Decapod QAPP (Windward 2009)).

CAS – creel angler survey
ID – identification

RM – river mile
SOP – standard operating procedure

QAPP Worksheet No. 29. Project Documents and Records Table

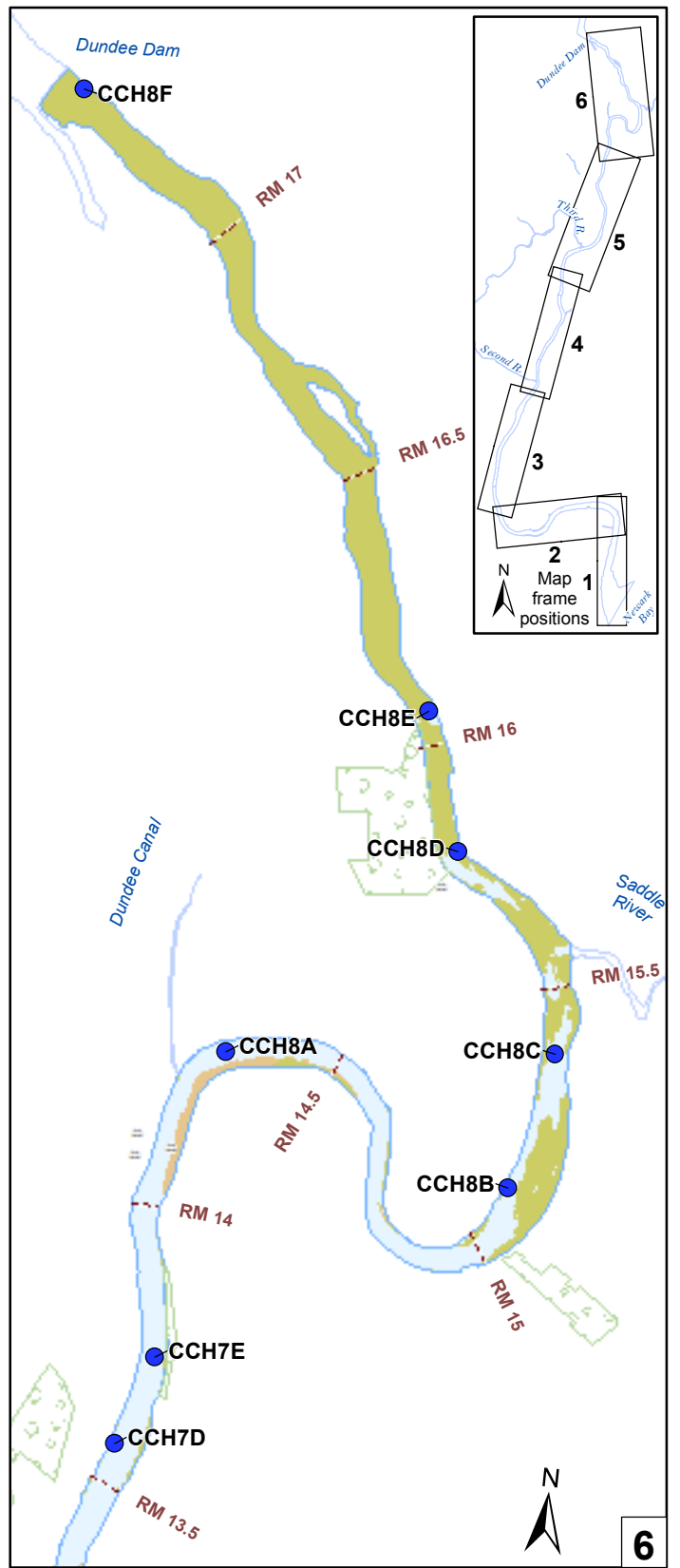
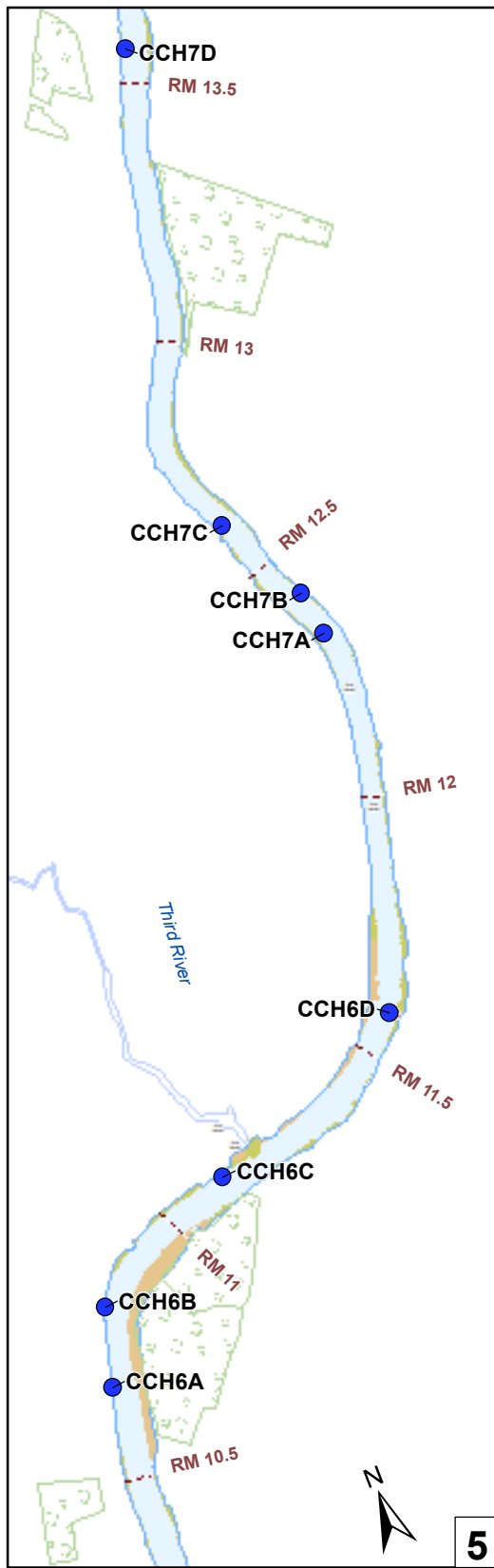
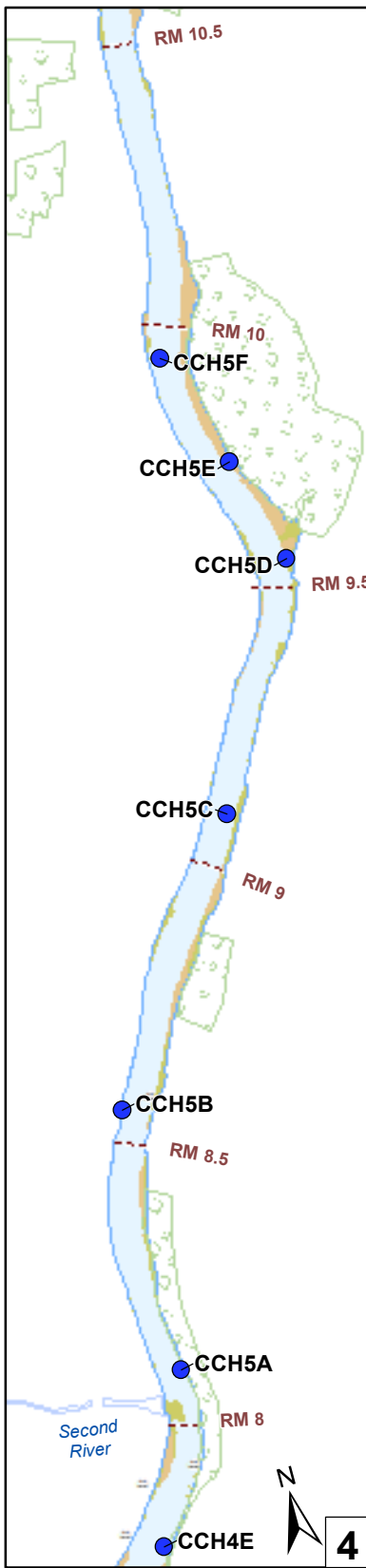
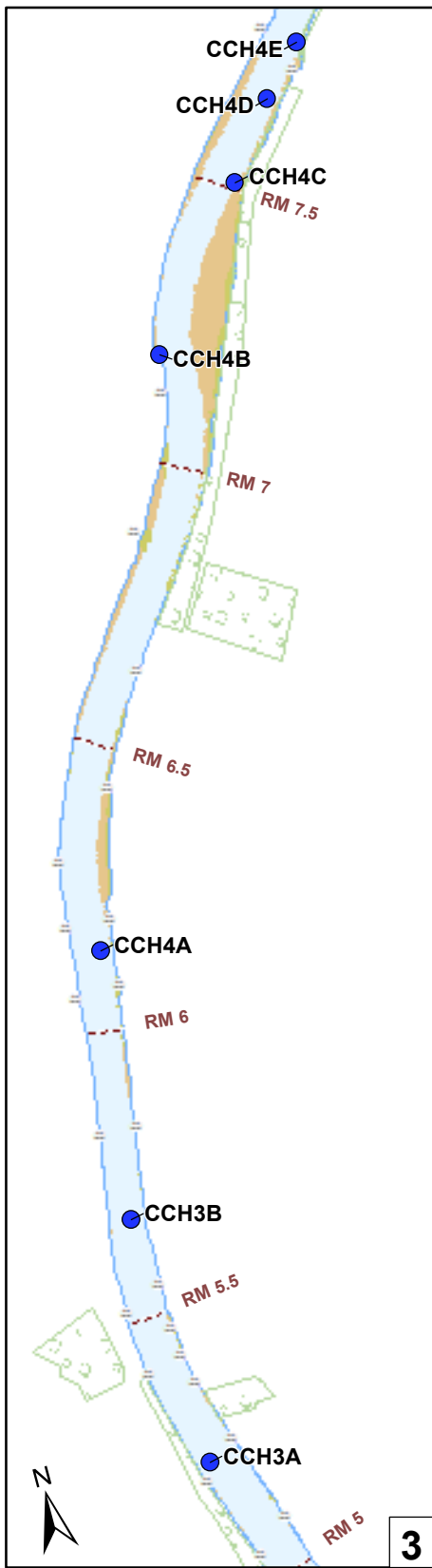
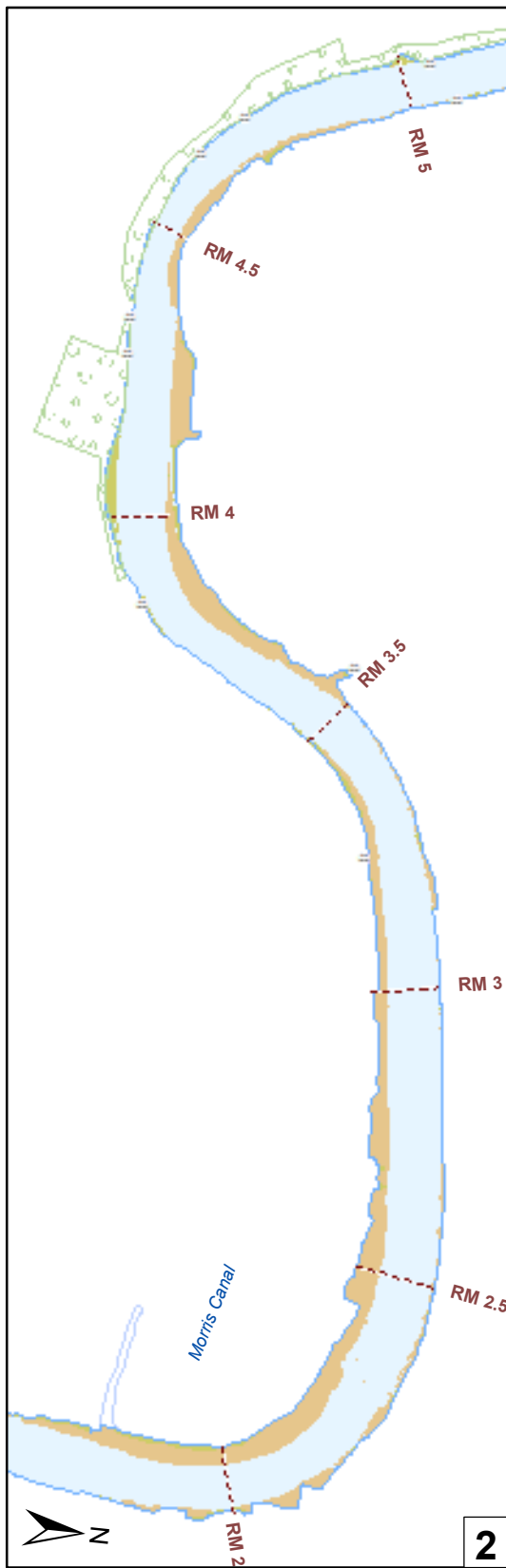
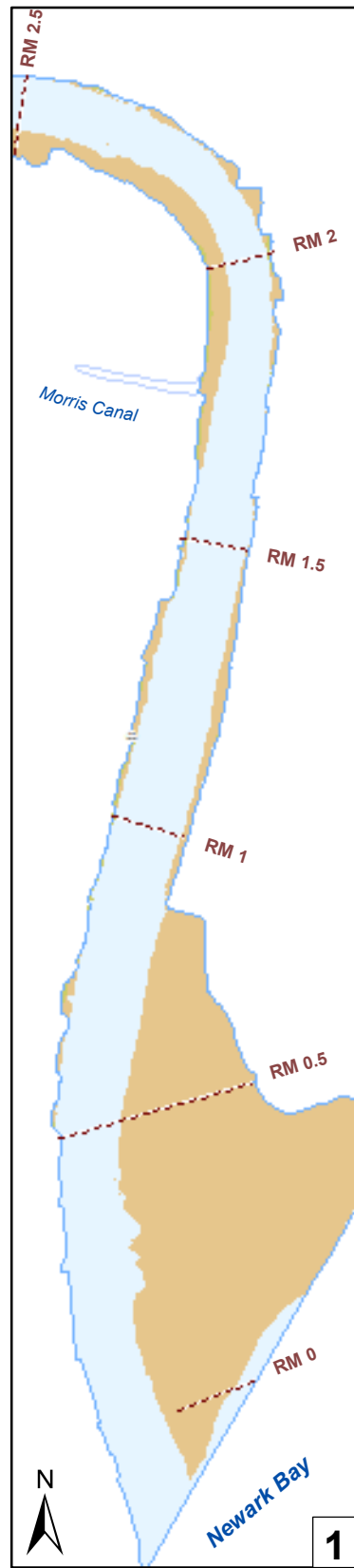
Monitoring Program Documents and Records	
On-site Analysis Documents and Records	
Downloaded GPS files	
Deliverables	
Carp harvest pilot study summary report	

QAPP Worksheet No. 37. Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:

All observations made during the pilot study will be considered usable if they are made according to the methods described in the applicable SOPs and are reasonable. No formal data usability assessment report will be prepared for the pilot study.

Any deviations from the SOPs will be documented, as appropriate, in the field logbook and on the Protocol Modification Form (Attachment A), and also approved by USEPA or its authorized representative.



References

- AECOM. [in prep]. Lower Passaic River Study Area creel/angler survey data report. Draft. March 2013. AECOM, Chelmsford, MA.
- Battelle. 2005. Lower Passaic River Restoration Project. Pathways analysis report. Prepared for US Environmental Protection Agency Region 2 and US Army Corps of Engineers. Battelle, Duxbury, MA.
- Malcolm Pirnie, Battelle, HydroQual. 2005. Lower Passaic River Restoration Project. Conceptual site model. Prepared for US Environmental Protection Agency, US Army Corps of Engineers, and New Jersey Department of Transportation/Office of Maritime Resources. Version 2005/08/02. Malcolm Pirnie, Inc., White Plains, NY; Battelle, Stony Brook, NY; Hydroqual, Inc., Mahwah, NJ.
- Malcolm Pirnie. 2007a. Lower Passaic River Restoration Project: Conceptual site model. Prepared for US Environmental Protection Agency, US Army Corps of Engineers, and New Jersey Department of Transportation/Office of Maritime Resources. Malcolm Pirnie, Inc., White Plains, NY.
- Malcolm Pirnie. 2007b. Lower Passaic River Restoration Project: Draft source control early action focused feasibility study. Malcolm Pirnie, White Plains, NY.
- USEPA. 2002. Role of background in the CERCLA cleanup program. OSWER 9285.6-07P. Office of Solid Waste and Emergency Response, Office of Emergency and Remedial Response, US Environmental Protection Agency, Washington, DC.
- USEPA. 2008. Memorandum from Stephen J. Ells. CSTAG recommendations for the Lower Passaic River site.
- Windward. 2009. Lower Passaic River Restoration Project. Lower Passaic River Study Area RI/FS. Quality Assurance Project Plan: Fish and decapod crustacean tissue collection for chemical analysis and fish community survey. Final. Prepared for Cooperating Parties Group, Newark, NJ. Windward Environmental LLC, Seattle, WA.
- Windward. 2010. Lower Passaic River Restoration Project. Fish and decapod field report for the late summer/early fall 2009 field effort. Final. Prepared for the Cooperating Parties Group, Newark, NJ. September 14, 2010. Windward Environmental LLC, Seattle, WA.
- Windward. 2011. Lower Passaic River Restoration Project. Lower Passaic River Study Area RI/FS. Fish community survey and tissue collection data report for the Lower Passaic River Study Area 2010 field efforts. Final. Prepared for

Cooperating Parties Group, Newark, NJ. July 20, 2011. Windward Environmental LLC, Seattle, WA.

Windward, AECOM. 2009. LPRSA human health and ecological risk assessment streamlined 2009 problem formulation. Final. Prepared for Cooperating Parties Group, Newark, New Jersey. Windward Environmental LLC, Seattle, WA; AECOM, Inc., Westford, MA.

Attachment A: Protocol Modification Form

Project Name and Number: _____

Material to be Sampled: _____

Measurement Parameter: _____

Standard Procedure for Field Collection & Laboratory Analysis (cite reference):

Reason for Change in Field Procedure or Analysis Variation: _____

Variation from Field or Analytical Procedure: _____

Special Equipment, Materials or Personnel Required: _____

Initiator's Name: _____ Date: _____

Project Manager: _____ Date: _____

QA Manager: _____ Date: _____

USEPA Authority: _____ Date: _____